

**Expert Rebuttal Report**

**Of**

**William E. Longo Ph.D.**

**For Asbestos P.I. Claims**

**Report Date: July 24, 2007**



## 1.0 Preface

On September 15, 2006 I prepared an Expert Report on behalf of Claimants that detailed W.R. Grace's Asbestos-Containing Products. My report contained a review of the source of the asbestos and vermiculite used in those products.<sup>1</sup> My expert report also outlined my opinion that the tradesmen and maintenance workers who mixed, sprayed and generally worked in the vicinity of these materials had the propensity to be exposed to elevated levels of airborne asbestos fibers.

On June 11, 2007, Dr. Richard J. Lee issued a Rebuttal Report on behalf of W.R. Grace. In it, he criticized some of the opinions issued in my September 15 expert report.<sup>2</sup> Specifically, Dr. Lee has asserted that W.R. Grace's asbestos-containing surface treatment products (fireproofing, acoustical plasters and spray texture materials) do not release any significant airborne asbestos fibers during either their application, or during the disturbance of their in-place asbestos-containing products. I submit this document in response to Dr. Lee's rebuttal report.

## 2.0 Executive Summary

1. In Lee's rebuttal report, he did not dispute the information in my report concerning the source of the chrysotile asbestos and vermiculite that W.R. Grace used in their asbestos-containing construction products. Also, Dr. Lee did not dispute that both the chrysotile and vermiculite used in their products were contaminated with tremolite. Therefore, no additional opinions on these subjects will be addressed in this rebuttal. A review of that information can be found in my September 15, 2006 expert report.<sup>1</sup>
2. Lee's statements that the indirect sample preparation method is impermissible for air samples, and that this method is not accepted in the scientific community are incorrect. The indirect sample preparation method has been in use for almost 30 years and is recommended by both the Environmental Protection Agency (EPA) and the International Standards Organization (ISO) for overloaded air samples.
3. Lee claimed that W.R. Grace's in-place asbestos-containing surfacing materials (ASM) are somehow unique in comparison to every other asbestos-containing friable materials when he stated that "when fractured they break into composite particles, not free fibers". His statement has no scientific basis, nor is it based on

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<sup>1</sup> William E. Longo, Ph.D., Expert Report "W.R. Grace Asbestos-Containing Construction Products: A Review of Asbestos Types and Sources", September 15, 2006.

<sup>2</sup> R.J. Lee, Ph.D., Expert Rebuttal Report – Project LLH609714 "For Asbestos PI Claims Estimation Proceeding", June 11, 2007.

any reliable data. As stated in my previous report, Graces' ASF is classified by the Environmental Protection Agency as friable. This means that Grace's in-place ASM can be crushed by hand pressure producing visible dust which contains free respirable asbestos fibers. The EPA has never recognized Dr. Lee's claim that Grace's ASM is somehow unique and therefore exempt from their rules and regulations concerning the disturbance or removal of in-place ASM.

4. Mixing, applying, disturbing or removing W.R. Grace's ASM will result in the release of significant amounts of airborne asbestos fibers. Dr. Lee's statements to the contrary are without merit. Even the references he cited to support his opinion provide air sampling data that demonstrates that workers would be exposed above current, and some past, OSHA excursion and Permissible Exposure Limits (PEL) during these activities.
5. Dr. Lee's opinion that what constitutes an asbestiform versus non-asbestiform tremolite is unique and is not accepted in the scientific community. A recent report by the EPA severely criticized Dr. Lee's non-asbestiform criteria, and his other opinions regarding asbestos exposure measurements, stating that they "contradicted generally accepted scientific principles for measuring asbestos exposure".<sup>3</sup>
6. The comparison of PCM to TEM measurement of ambient air samples in buildings that contain in-place ASM, or of air samples taken during maintenance activities while using industrial hygiene controls are not indicators of potential airborne asbestos exposure during the mixing, application or in-place disturbance of ASM for operations and maintenance when no dust controls were used. Dr. Lee's so-called PCM to TEM fiber conversion factors are not scientifically valid, and are not accepted by any federal agency that regulates airborne asbestos exposures.

**The Lee Rebuttal Report claims that Longo relies on data generated using an inappropriate analytical method** - Dr. Lee stated in his report that W.R. Grace's asbestos-containing construction products will not release elevated levels of asbestos fibers either during their application (mixing & spraying) or during the disturbance of in-place material. Dr. Lee pointed to our own study (MAS Study "Monokote Mixing for Gunning Work Practice Study) to support this opinion.<sup>4</sup> Even though we found very high levels of airborne asbestos fibers during the pouring of one bag of Monokote (129 to 235

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<sup>3</sup> United States Environmental Protection Agency Region IX: Response to the November 2005 National Stone, Sand & Gravel Association Report Prepared by the R.J. Lee Group Inc. "Evaluation of EPA's Analytical Data from the el Dorado Hills Asbestos Evaluation Project", April 2006.

<sup>4</sup> Monokote Mixing for Gunning: Work Practice Simulation Demonstration, Materials Analytical Services Inc., March 1998 Report and video.

fibers/cc) using PCM analysis, Dr. Lee claimed that we used an improper sample preparation method (indirect sample preparation), and therefore should somehow disregard this important data. Dr. Lee's opinion about indirect sample preparation is erroneous and not based on sound science.

What Dr. Lee did not say was that the indirect sample preparation is accepted in the industrial hygiene scientific community and consequently has been used by both NIOSH and the EPA to measure asbestos concentrations for the determination of potential health hazards.<sup>5,6</sup>

The issue of indirect sample preparation has been discussed at length in my previous expert reports, which are incorporated herein by reference.<sup>7,8</sup> A brief summary of indirect sample preparation is as follows:

The indirect sample preparation method for asbestos-containing air samples was developed in the early 1970's by the EPA as an analytical tool as a way to examine overloaded air samples collected in typical air filter cassettes. When an air sample filter is "overloaded" with airborne particulates, which usually happens when the air sample was collected in a very dusty environment, it cannot be analyzed by the direct method. It cannot be analyzed because the particulates and asbestos fibers pile on top of each other on the overloaded sample filter, and individual fibers of interest cannot be seen in the microscope, much less counted. Instead of discarding the overloaded air filter sample, a procedure was developed by the EPA to reduce the concentration of particulates/fibers on the filter by a dilution process. This dilution, or re-suspension procedure, was called the indirect sample preparation technique.

When the air samples were collected in the MAS Monokote Mixing for Gunning Work Practice Study they were overloaded with particulate and asbestos fibers to a degree which made them un-analyzable by the direct preparation method. Instead of discarding the air samples, they were prepared by the indirect method and then analyzed by optical microscopy (PCM) using the NIOSH 7400 method. As will be discussed, using the indirect sample method does not invalidate the analytical results of the MAS Monokote study. Rather, it provides an indication of the problem created when a full bag of W.R. Grace's Monokote-3 is poured into a hopper at a work site.

The analysis of overloaded asbestos air samples has been done by the indirect measurement technique for almost 30 years. This method is well accepted by the scientific community and includes protocols developed by both the EPA and the International Standards Organization (ISO). These protocols are as follows:

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<sup>5</sup> NIOSH Health hazard Evaluation, Report No. 87-126, March, 1990.

<sup>6</sup> U.S. Environmental Protection Agency, "Sampling and Analysis of Asbestos in Dust Collected in Archived W.R. Grace Documents", Contract No: N00174-99-D-003.

<sup>7</sup> William E. Longo, Ph.D., Expert Report – "The Scientific Reliability of the ASTM D-5755-3 Dust Method for the Quantification of Asbestos Surface Contamination", December 8, 2005.

<sup>8</sup> William E. Longo, Ph.D. Expert Report – Prepared on Behalf of the Property Damage Asbestos Claimants Represented by the Law Firm of Dies & Hile, LLP, October 25, 2006.

- 1) Samudra, et al., "Electron Microscopy Measurement of Airborne Asbestos Concentrations" Provisional Methodology Manual, EPA 600/2-77-178, 1978.
- 2) Anderson and Long, "Interim Method for Determining Asbestos in Water" EPA 600/4-80-005, 1980.
- 3) Chatfield and Dillion, "Analytical Method for the Determination of Asbestos Fibers in Water", EPA 600-4-83-043, 1983.
- 4) Yamate, et al., "Methodology for the Measurement of Airborne Asbestos by Electron Microscopy", 68-02-3266, 1987. Draft
- 5) Chatfield, "Analytical Protocol for the Determination of Asbestos Contamination of Clothing and Other Fabrics" Microscopy 38:221-222, 1990.
- 6) Chatfield and Berman, "Superfund Method for the Determination of Asbestos in Ambient Air, Part 1, Method, EPA 540/2-90/005B, 1990.
- 7) Chatfield, "Ambient Air, Determination of Asbestos Fibers, Indirect-Transfer Transmission Electron Microscopy Method, International Standard Organization, ISO 13794, 1999.

As discussed above, the indirect preparation method was developed by the EPA in the 1970's as a way to deal with overloaded filter problems. In a research report issued in 1990 by the EPA, which compared the analytical results of indirect and direct sample preparation, it was stated that the indirect sample preparation method was thought to provide greater control over the analytical precision through improved distribution of materials over the surface of the filter.<sup>9</sup> Many scientists now believe that using the indirect sample preparation method is the most accurate method for the determination of airborne asbestos concentrations in heavily contaminated atmospheres like the one that was caused by the dumping of one bag of W.R. Grace's Monokote-3 into a hopper.

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<sup>9</sup> Environmental Protection Agency "Comparison of Airborne Asbestos Levels Determined by Transmission Electron Microscopy (TEM) Using Direct and Indirect Transfer Technique" EPA 560/5-89-004, March, 1990.

**Dr. Lee claimed in his report that there are a series of historical studies<sup>10,11,12,13</sup> that measured asbestos levels in the field during the use of Monokote-3, and that each of these studies show that airborne fiber exposures were at or below the existing exposure limits at the time of the study** -This is an interesting statement by Dr. Lee in that when a close examination of each of these studies is done, they all demonstrate that mixing and applying W.R. Grace's Monokote-3 releases significant amounts of airborne asbestos fibers. This causes worker's exposure in excess of many of OSHA's historical permissible exposure limits. By Dr. Lee's own report, he states that these studies "show that airborne fiber exposures were at or below existing exposure limits". Asbestos fiber levels at existing OSHA limits are significant airborne exposures. This finding by Dr. Lee is consistent with my September 15, 2006 expert report. For completeness, each of Dr. Lee's historical references will be examined one by one.

**Lee Rebuttal Reference #13:** Caplan *et al.*, "Report of an Industrial Hygiene Study at Beverly Hills High School". The Caplan study was performed in 1968. Air samples were taken during the mixing and spraying of Monokote-3, and were collected using the ACGIH impinger method. The average asbestos dust air sample results for both the mixing and application of the Monokote-3 were 1.0 million particles/cubic foot (MPPCF). The 1970 ACGIH standard for asbestos exposure was 2.0 million MPPCF or 12 fibers/cc.

Using this conversion of 1.0 MPPCF or 6 fibers/cc demonstrates that the Caplan study shows a higher measured fiber level than the 1972 OSHA PEL standard of 5.0 fibers/cc. The Caplan study clearly demonstrates significant asbestos fiber release from the spraying of Monokote-3..

**Lee Rebuttal Reference #14:** Cooper *et al.*, "Asbestos Fiber Concentrations in Air From Spray Fireproofing Operations Using Zonolite Products". The Cooper study measured both mixing and application of Monokote-3 in various buildings in San Francisco in 1970. The air samples were analyzed by the optical PCM method, and the results expressed in fibers/cc. The time weighted average results for breathing zone air samples for both the application and mixing were reported as follows:

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<sup>10</sup> Caplan, P.E., M. Bent, J. Eisen, R. Rothfelder, D.D. Nigh, J.A. Elliott and E. Rademacher: Report on Industrial Hygiene Study at Beverly Hills School. California Department of public Health Study No. S2058, November 22, 1968.

<sup>11</sup> Cooper, W.C., J.L. Balzer and D. Fowler: "Asbestos Fiber Concentrations in Air from Spray Fireproofing Operations Using Zonolite Products". Tabershaw Cooper Associates, Berkeley, CA, July, 1970.

<sup>12</sup> Werby, R.T.: "Laboratory Report of Samples Submitted by Construction Products Division, W.R. Grace & Co., Cambridge, MA. Werby Laboratories Inc., Boston, MA., September 28, 1970.

<sup>13</sup> Brown, H.A.: Memo to R. Rothfelder, W. Pickthall and R.W. Stervett. Air Samples on Monokote Job. Construction Products Division, October 2, 1970.

	Mixing	Application
Embarcadero	5.3 fibers/cc	0.8 fibers/cc
PG&E	3.2 fibers/cc	1.1 fibers/cc
Hilton Towers	2.5 fibers/cc	1.1 fibers/cc

The Cooper study again demonstrated that when W.R. Grace Monokote-3 was mixed and applied in the field, the Grace product generated asbestos fiber levels that were above the current, and many of the historical, OSHA PEL limits. The Cooper study demonstrates that the mixing and application of Grace ASM will cause significant airborne fiber level exposures to workers.

**Lee Rebuttal Reference #15 & #16:** These two references are the same document so only one will be discussed here. The Werby Laboratories collected Monokote-3 samples from a job in Chicago in 1970. They analyzed the samples by optical microscopy using the PCM technique. The result they reported for the mixing was 7.3 fibers/cc and for application was 2.6 fibers/cc. These airborne asbestos fiber results were above current and historical OSHA PEL's, and again demonstrated significant asbestos fiber exposure to the workers. This document was also referenced in my September 15, 2006 expert report contrary to Dr. Lee's assertion that I ignored the historical literature.

In addition to Grace's own historical documents demonstrating significant fiber release during the mixing and application of Monokote-3, there is a peer-reviewed publication by Reitze *et al.* entitled "Application of Sprayed Inorganic Fiber Containing Asbestos: Occupational Health Hazards" that was published in the American Industrial Hygiene Association Journal in March of 1972.<sup>14</sup> This paper was written by the Mt. Sinai School of Medicine and the lead investigator on the project was Dr. Irving J. Selikoff.

In Selikoff's publication, they described a "cementitious" asbestos-containing fireproofing with chrysotile asbestos, gypsum, cement and vermiculite as the ingredients. This description fits W.R. Grace Monokote-3. Air samples were taken in a multistory building in New York City using the optical microscopy method (PCM). Selikoff reported breathing zone fiber levels of the applicator as being between 30 to 99 fibers/cc. These airborne asbestos levels are three to ten times higher than the 1972 OSHA excursion limit, again showing significant exposure to asbestos fibers to the workers.

It is clear from the Lee references, the Selikoff peer-reviewed publication, and the MAS Monokote-3 pouring study that **Dr. Lee is in error** when he states that the mixing and

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<sup>14</sup> Reitze, W.B., Nicholson, W.J., Holaday, D.A. and Selikoff, I.J.: "Application of Sprayed Inorganic Fiber Containing Asbestos" Occupational Health Hazards, American Industrial Hygiene Assoc. Journal, pp. 178-191, March 1972.

application of W.R. Grace asbestos-containing surface treatment products do not produce significant levels of airborne asbestos fibers.

**Dr. Lee claims that Grace building materials are Cementitious as defined by ASTM C11-89, 1989** - Dr. Lee suggested in his expert report that because of Grace's in-place asbestos containing materials meet the ASTM C-11 definition of cementitious materials, they will not release asbestos fibers when disturbed. By using the ASTM C-11 cementitious definition Dr. Lee implied that the Grace materials have cement or concrete-type physical properties making them very hard structural materials that will lock in asbestos fibers, similar to steel rods in a concrete column. This, of course, is not true. In fact, when Dr. Lee utilized the "rigid mass" statement in this definition, he neglected to state that many types of dirt or mud when mixed with water and asbestos fibers, will harden to a rigid mass that will meet this ASTM definition. But like the W.R. Grace Products we are discussing, dried muds can usually be crushed by hand pressure thereby releasing free asbestos fibers into the environment.

The ASTM C-11 definition for cementitious materials comes from a standard set of definitions that are specific to gypsum building material, such as plasters and joint compounds.<sup>15</sup> The title of the standard is "Standard Terminology Relating to Gypsum and Related Building Materials and Systems", and is not related to any physical properties of cement or concrete. There is no indication that these standard sets of definitions relate to asbestos-containing acoustical plasters, fireproofing, or surface textured products that were manufactured and sold by W.R. Grace.

**The Lee Rebuttal Expert Report claimed that Grace asbestos-containing materials are cementitious materials that when fractured break into composite particles, not free asbestos fibers-** As stated above, Dr. Lee used the ASTM gypsum plaster and joint compound definitions to argue that W.R. Grace in-place asbestos containing materials dry into a "rigid mass" after mixing with water, and therefore will not release asbestos fibers when disturbed by physical contact. This statement by Dr. Lee is not supported by the EPA in their definition of friable asbestos-containing materials. Nor is it substantiated by a study performed at MAS that was designed to specifically answer this question. A description of this study and its results follows.<sup>16</sup>

In July of 1996 MAS performed a work practice study entitled "W.R. Grace Monokote-3 Pulverization Demonstration". In this MAS study, Grace Monokote-3 was collected from the Bell South building in Birmingham Alabama and was then tested for friability and asbestos fiber release under controlled conditions. Inside the MAS Exposure Characterization Laboratory (ECL), the Monokote-3 was pulverized by hand pressure in the vicinity of the two investigators performing the study. The study was run for

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<sup>15</sup> ASTM C11-07, "Standard Terminology Relating to Gypsum and Related Building Materials and Systems".

<sup>16</sup> W.R. Grace Monokote-3 Pulverization Study: Materials Analytical Services Inc., July 1996 Report and video.



approximately 15 minutes, and 10 air samples were collected and analyzed by both PCM and TEM. The PCM samples were analyzed by the NIOSH 7400 method using the direct method.

The results of this study showed that the investigators/workers had an average exposure of 23.2 fibers/cc. These results are 2.3 times higher than the 1972 OSHA excursion limit of 10 fibers/cc. If this was the only exposure that a worker had during the day, he would have had a PEL of 0.7 fibers/cc, which is 7 times above the current OSHA limit of 0.1 fibers /cc. This study clearly demonstrates that W.R. Grace's fireproofing material is friable and can release significant amounts of airborne asbestos fibers when physically disturbed.

If Dr. Lee's statements regarding the inability of the material in W.R. Grace's products to release asbestos fibers when disturbed were true W.R. Grace's products were true then W.R. Grace's asbestos-containing products would not be subject to EPA and OSHA asbestos regulations. That is, when buildings are abated of W.R. Grace's asbestos-containing materials there would be no requirements for containment or the need for worker respiratory protection during the removal process. To date, this is not the case.

**The Lee Rebuttal Expert Report claimed that Longo incorrectly stated that Grace Products contain significant amounts of tremolite asbestos** - In my September 15, 2006 expert report, I provided an opinion that W.R. Grace asbestos-containing surface treatment products were contaminated with asbestiform tremolite. Dr. Lee's rebuttal expert report does not dispute the presence of the tremolite from either the chrysotile or the vermiculite used by Grace in their construction products. He only claims that the amount of tremolite present in finished Grace products is in small amounts. This position is consistent with my September 15, expert report.

However, as described in my report, a 1977 internal W.R. Grace memorandum by Eschenbach discussed the problem of small amounts of tremolite in the vermiculite ore.<sup>17</sup> The Eschenbach memo included the following: "a small amount of fibrous material. in the ore can give significant amount of airborne fiber". This small amount of tremolite in the final products will expose individuals who work around asbestos-containing Grace products.

**The Lee Rebuttal Expert Report claims that over a 30 year period, it has never been demonstrated that there has been a release of amphibole asbestos from disturbance of a Grace surfacing material** -This statement by Lee is simply not true. In fact, W.R. Grace's own air sample testing done in 1988 demonstrated that when their vermiculite

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<sup>17</sup>March 14, 1977 Memo. From H.A. Eschenback to E.S. Wood.

based “non-asbestos” fireproofing was sprayed, significant amounts of amphibole asbestos fibers was released.<sup>18,19</sup>

#### Background on the Grace Testing

In 1988 my laboratory was contacted by W.R. Grace Industrial Hygienist, Mr. David Curreri, requesting that we analyze air samples taken during the application of Monokote-5 for the presence of amphibole (tremolite/actinolite) asbestos. Mr. Curreri discussed the problem of detecting small or trace amounts of tremolite/actinolite asbestos in the air samples because of the potential overloading problem associated with the vermiculite and gypsum ingredients in the Monokote-5 fireproofing. Mr. Curreri requested that we analyze the air samples using the indirect sample preparation method and analyze the samples by TEM. We carried out the analysis as requested, and our results showed that airborne tremolite/actinolite fibers were detected in the Grace air samples. When these results were reported to the W.R. Grace scientist, the validity and findings of amphibole asbestos in their air samples was never questioned.

The 1988 testing by Grace is important for the following points:

1. When state-of-the-art air testing was done during the spraying of a Grace surface treatment product, tremolite/actinolite asbestos fibers were detected.
2. For their own study the Grace scientist requested that the air samples were to be prepared by the indirect method, and then analyzed by TEM. This, in my opinion, shows that only in the litigation context is W.R. Grace critical of the indirect sample preparation method and TEM analysis.

The last sentence in section 3.4 of Lee’s Expert Rebuttal report claims that there is no evidence that Grace products release amphibole asbestos. W.R. Grace’s own in-house air sample testing contradicts this statement by Dr. Lee, and shows that his opinion about this issue is in error.

**The Lee Rebuttal Report claims that EPA and others have routinely shown that a significant portion of the amphiboles found in the Libby vermiculite is non-asbestiform** -Dr. Lee did not state either the amount, other than calling it significant, or to what EPA studies he is referring to reach this conclusion. This statement by Dr. Lee is not consistent with EPA’s superfund work at Libby Montana, our own analysis of Libby Montana bulk samples or W.R. Grace’s own analysis when they operated the Libby vermiculite mine.

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<sup>18</sup> David J. Curreri, W.R. Grace Construction Products Division, May 3, 1988 letter to William E. Longo, Ph.D.

<sup>19</sup> John J. Henningson, W.R. Grace Construction Products Division, June 9, 1988 letter to William E. Longo, Ph.D.

## EPA and Asbestiform Tremolite

Dr. Lee has a long history of suggesting that the EPA has misidentified tremolite in the vermiculite ore at Libby site as well as with other amphibole rich regions of the United States.<sup>3</sup> Dr. Lee bases his opinion concerning this issue on what he believes is the definition of what constitutes an asbestiform tremolite versus a non-asbestiform material when air samples are analyzed. In order for an amphibole fiber to meet Dr. Lee's criteria, it must have an aspect ratio (length divided by the width) of at least 20 to 1 toward 100 to 1.<sup>20</sup> This definition by Dr. Lee only applies to bulk samples and is improper to use for air sample analysis using optical and TEM methodology. It is not recognized by any federal agency that regulates the amount of asbestos fibers in the workplace or the environment. For air sample analysis of asbestos fibers when analyzed by OSHA, NIOSH, EPA, ISO or ASTM methodology, it is required that the aspect ratio meet a minimum of 3 to 1 or 5 to 1 aspect ratio not the high aspect ratios claimed by Lee.

When Dr. Lee uses his own asbestos fiber count criteria, he can artificially reduce the amount of asbestos fibers in an air sample. This is advantageous for his clients, including W.R. Grace and the National Stone, Sand & Gravel Association. **A review of Dr. Lee's amphibole identification counting definition was issued by the EPA in April of 2006. It stated that R.J. Lee Group drew conclusions concerning air data collected El Dorado Hills project that are contradicted by generally accepted scientific principles for measuring asbestos exposure.**

## W.R. Grace and Libby Montana Amphibole Asbestos

In my September 15, 2006 Expert Report I discussed at length the W.R. Grace documents concerning their own analysis of the tremolite in the Libby vermiculite ore.<sup>1</sup> I have been unable to locate in any of Grace's internal documents regarding their own testing from the 1960's through the 1980's, or in their own discussions of their tremolite problem any suggestion that a significant amount of the tremolite asbestos in their ore is non-asbestiform. This non-asbestiform tremolite issue in Libby vermiculite only seems to have surfaced when Dr. Lee became involved as an expert on behalf of W.R. Grace.

## MAS Contract for EPA Libby Superfund Site Sample Analysis

For the last few years MAS has provided hundreds if not thousands of results of bulk, air and dust analysis of samples collected by the EPA at the Libby superfund site. Our analytical results do not support Dr. Lee's position that a significant amount of the fibrous amphibole present is non-asbestiform.

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<sup>20</sup> Mine Safety and Health Administration Asbestos Hearing Panel, Charlottesville, Virginia, June 20, 2002.

**The Lee Rebuttal Expert Report claims that when PCM air sample analysis is compared to TEM analysis, the majority of the fibers counted by PCM are found to be non-asbestos by TEM -** Dr. Lee suggests in this section of his rebuttal report that all PCM air sample asbestos fiber results are mostly non-asbestos when compared to TEM. Dr. Lee goes to great lengths to develop a conversion factor that he can apply to PCM air sample analysis, thereby greatly reducing the overall asbestos concentration. What Dr. Lee did not point out is that he used invalid methodology that is not generally accepted in the scientific community.

#### The use of Ambient Air Samples to Determine PCM Fiber Conversion Factors

As Dr. Lee states in his report, to date, no general conversion factor has been developed to generate this type of data. This is especially true when using ambient air sample analysis (no asbestos-containing materials disturbed) to compare air samples collected when W.R. Grace asbestos-containing products are mixed, applied or disturbed once in place. Nevertheless Dr. Lee now proposes one that has never been reviewed by the scientific community. Ambient air samples collected in buildings that have in-place asbestos-containing surface treatment materials are not expected to produce significant levels of airborne fibers if the material is not disturbed. In fact, the fiber concentrations are typically in the hundredths to thousandths of a fiber/cc (0.01 to 0.001 f/cc). These analytical results are usually the result of less than 7 to 10 fibers actually counted on the air filter, in 100 fields of view with the optical microscope when using the NIOSH 7400 method, and because these are ambient air samples, other fibers in addition to asbestos are expected to be present in the air sample. There are no disputes in the scientific community of this fact.

In contrast to the ambient air samples, when air samples are collected during the application or disturbance of W. R. Grace's ASM, hundreds of fibers may be counted in the same area of the air filter that was analyzed for the ambient air samples. Since an asbestos-containing product is being disturbed for these air sample analysis, a majority of the fibers counted are asbestos fibers and not non-asbestos fibers, as found in the ambient air samples. This fact is not disputed by either NIOSH or OSHA and is the basis of their perspective PCM fiber air sampling and analysis protocols. In direct contrast to Dr. Lee's unique conversion factor reducing the amount of asbestos fibers in work place air samples, the HEI-AR group found the opposite.<sup>21</sup>

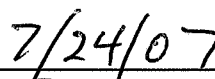
When the HEI-AR studied the whole issue of potential asbestos exposure in occupied buildings one of the area's they looked at was the comparison of PCM asbestos fiber levels to TEM results with side-by-side or on the same air samples. Their findings were that the PCM results, in some cases, underestimated the amount of asbestos fibers present in the air samples when compared to TEM results. The chairman of the HEI-AR group,

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<sup>21</sup> Archibald Cox, Chairman Board of Directors HEI-AR Group, August 6, 1993 letter to Mr. David Zeigler, Acting Assistant Secretary for Occupational Safety and Health Administration.

Archibald Cox, sent a letter to OSHA detailing these findings and asking them to reconsider their use of PCM for the determination of work place exposures to airborne asbestos fibers.

  
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William E. Longo, Ph.D.

  
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Date

## **VITAE**

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### **EDUCATION**

October 1980 to December 1983	Received Doctor of Philosophy in Materials Science and Engineering, University of Florida.
June 1979 to October 1980	Completed the requirements for a Master of Science in Materials Science and Engineering, University of Florida.
September 1972 to June 1977	Received Bachelor of Science degree; Major in Microbiology, Minor in Chemistry, University of Florida.

### **PROFESSIONAL WORK HISTORY**

September 1987 to Present	President of MAS, LLC (previously Materials Analytical Services Inc) Suwanee, Georgia
August 1987 to February 1988	President and Founder of Longo Microanalytical Services, Inc., Gainesville, Florida.
October 1983 to August 1987	President and Founder of Micro Analytical Laboratories, Inc., Gainesville, Florida.
March 1985 to December 1987	Visiting Assistant Professor; University of Florida, Department of Materials Science and Engineering.
August 1983 to March 1985	Post Doctoral Associate; University of Florida, Department of Materials Science and Engineering.

### **PATENTS**

U. S. Patent Serial No. 4,671,954 June 1987. Goldberg, E. P., Longo, W. E., and Iwata, H., "Microspheres for Incorporation of Therapeutic Substances and Methods of Preparation Thereof."

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### PATENT APPLICATIONS

U. S. Patent Application Serial No. 937,611 December 1986. Longo, W. E., McCluskey, R. A., and Goldberg, E. P., "Magnetically Responsive, Hydrophilic Microspheres for Incorporation of Therapeutic Substances and Methods of Preparation Thereof."

### PUBLICATIONS AND PRESENTATIONS

Health Effects of Welding, "The Characterization of Welding Fume Particulates and Mn Bioavailability Studies for SMAW and FCAW Consumables" Longo, W.E., Rigler, M.W., Russell, P.E., Vitarelli, J.P., Hoffmann, E.M., & Johnson, H.M. NIOSH, West Virginia, July 2005

Harris, M.D., Ewing, W.M., Longo, W., DePasquale, C., Mount, M.D., Hatfield, R.L. & Stapleton, R. "Manganese Exposure During Shielded Metal Arc Welding (SMAW) in an Enclosed Space" J. Occup. & Environ. Hyg 2(8) 375 -382, 2005.

Longo, W.E., Egeland, W.B., Hatfield, R.L., Stapleton, R., and Hubbard J., "Tremolite Analysis of Chrysotile Containing Friction and Gasket / Packing Products", ASTM Johnson Conference, Johnson Vermont, July 2002.

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Hatfield, R.L., Krewer, J.A., and Longo, W.E., "A Study of the Reproducibility of the Micro-Vac Technique as a Tool for the Assessment of Surface Contamination in Buildings with Asbestos Containing Materials" (M.E. Beard and H.L. Rook) in Advances in Environmental Measurement Methods for Asbestos, ASTM #STP 1342,301, January 2000.

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Longo, W.E., "Malignant Mesothelioma in Kent Cigarettes Smokers: Analysis of Asbestos Content in Filters, Cigarette Smoke and Lung Tissue" Society for Ultrastructural Pathology, March 1996.

Longo, W.E., "The Identification of Asbestos Containing Surface Treatment Products using Standard Analytical Techniques" Florida Environmental and Asbestos Council Meeting, January 1996.

Longo, W.E., Rigler, M.W. and Slade, J., "Crocidolite Asbestos Fibers in Smoke from Original Kent Cigarettes" Cancer Research 55 11, 2232, 1995.

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Longo, W.E., "Occupational Exposure From In-Place Asbestos Containing Fireproofing" Environmental Information Association, April 1995.

Keyes, D. L., Ewing, W. M., Hays, S. M., Longo, W. E. and Millette, J.R., "Baseline Studies of Asbestos Exposure During Operations and Maintenance Activities" Appl. Occup. Environ. Hyg. 9(11) Nov, 1994.

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Longo, W. E. "A Standard Method for the Analysis of Asbestos in Settled Dust by TEM" Asbestos Measurement Risk Assessment and Laboratory Accreditation, ASTM Conference, July 1992. Johnson, Vermont.

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Goldberg, E. P., Yalon, M., and Longo, W. E. "Low Voltage SEM for Unique Surface Analysis of Prosthetic Devices" Materials Research Society Symposium Proceedings 110, Biomedical Materials and Devices, 1989.

Longo, W. E. "Field Emission Scanning Electron Microscopy: An Alternative Technique for the Analysis of Asbestos Air Filter Samples" National Asbestos Council, September 1988. Boston, Massachusetts.

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Longo, W. E. "Rinse Technique for Recovery of Air Samples for TEM Analysis" Asbestos Measurement Research and Laboratory Accreditation, ASTM Conference, July 1988. Johnson, Vermont.

Longo, W. E. "The Presence of Inorganic Fibers in Commercial Brands of Cigarettes" American Industrial Hygiene Conference, May 1988. San Francisco, California.

Longo, W. E. "Analysis of Asbestos by Transmission Electron Microscopy" Alabama Electron Microscopy Society 7th Annual Meeting, March 1988. Birmingham, Alabama

Longo, W. E. "Asbestos Fiber Loss from Air Sampling Cassettes: A Study by Transmission Electron Microscopy" EPA/APCA Symposium on Measurement of Toxic and Related Air Pollutants, May 1987. Research Triangle Park, North Carolina.

Longo, W. E. "Asbestos Air Sample Analysis by Transmission Electron Microscopy" American Industrial Hygiene Conference Professional Development Course, May 1987. Montreal, Canada.

Longo, W. E., Jenkins, E. J., Greene, R., and Baxter, D. "Water Refiltration: An Alternative Sample Preparation Method for the Analysis of Airborne Asbestos by TEM" National Asbestos Council, January 1987. Chicago, Illinois.

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Longo, W.E., "Albumin Microspheres for the Controlled Release of Therapeutic Agents" Doctor of Philosophy Dissertation, University of Florida, 1983.

Longo, W. E., and Goldberg, E. P. "Novel Albumin-Polypeptide-Drug Microspheres: Synthesis and Ion Exchange Drug Release Properties" Proceedings of the 10th International Symposium on Controlled Release of Bioactive Materials, 10, 245, 1983.

Longo, W. E., Iwata, H., Lindheimer, T., and Goldberg, E. P. "Preparation and Drug Release Properties of Albumin-Polyglutamic Acid-Adriamycin Microspheres" American Chemical Society, 24, 56, 1983.

Longo, W. E., Iwata, H., Lindheimer, T., and Goldberg, E. P. "Preparation of Hydrophilic Albumin Microspheres Using Polymeric Dispersing Agents" J. Pharm. Sci., 71, 1323, 1982.

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Longo, W. E., Iwata, H., and Goldberg, E. P. "Hydrophilic Albumin-Polyglutamic Acid-Adriamycin Microspheres for Localized Chemotherapy" 8th Annual Meeting of the Society of Biomaterials, 10, 60, 1982.

#### ACTIVITIES AND ORGANIZATIONS

- \* Member of Environmental Protection Agency Workshop on Sampling and Analysis of Asbestos in Settled Dusts, July 1989.
- \* Member of Environmental Protection Agency Peer Review Group for the Asbestos Engineering Program, 1987 to present.
- \* Vice-Chairman of the National Asbestos Council Analytical Subcommittee on Transmission Electron Microscopy 1987-1988.
- \* Chairman of National Asbestos Council Analytical Subcommittee on Transmission Electron Microscopy 1988-1989.
- \* Member of ASTM D-22-05 Subcommittee for Indoor Air Pollution.

#### LECTURES AND COURSES INSTRUCTED

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Longo, W.E. "Electron Microscopy for Industrial Hygiene Applications" American Industrial Hygiene Conference Professional Development Course, Atlanta GA, May 2004.

Longo, W. E. "Settled Dust: Asbestos and Other Particulates"  
Georgia Institute of Technology Seminar, August 1991.

Longo, W. E. "The Role of the Laboratory Manager, Quality Assurance Officer and the Analyst for NIST Accreditation" Georgia Institute of Technology, Transmission Electron Microscopy Asbestos Accreditation Seminar, August 1989.

Longo, W. E. 24th Annual Meeting of the Microbeam Analysis Society,  
"Asbestos Analysis Session" Ashville, North Carolina, July 1989 (Session Co-Chairman).

Longo, W. E. "Fundamentals of Asbestos Analysis by TEM" Institute in Materials Science State University of New York. New Paltz, New York, October 1988 (Course Director).

Longo, W. E. "TEM Imaging/Photography" Georgia Institute of Technology, Transmission Electron Microscopy Asbestos Analysis Course, June 1988.

Longo, W. E. "Laboratory Preparation of Polycarbonate Filters for TEM Analysis"  
Georgia Institute of Technology, Advanced Transmission Electron Microscopy Asbestos Analysis Course, February 1988.

Longo, W. E. "Transmission Electron Microscopy Laboratory Set-Up" Georgia Institute of Technology, Advanced Transmission Electron Microscopy Asbestos Analysis Course, February 1988.

Longo, W. E. "Laboratory Analysis of Asbestos" Hall-Kimbrell Seminar in Asbestos Abatement in the State of Florida, January 1988.

Longo, W. E. "Air Sample Preparation and Analysis by TEM" Georgia Institute of Technology, Clearance Testing for Asbestos: AHERA Regulations, October 1987.

Longo, W. E. "Asbestos Air Sample Analysis by Transmission Electron Microscopy"  
American Industrial Hygiene Conference Professional Development Course, Montreal, Canada, May 1987.

Longo, W.E. "Asbestos Air Sample Analysis by Transmission Electron Microscopy"  
American Industrial Hygiene Conference Professional Development Course, Dallas, TX May 1986.

**PROFESSIONAL MEMBERSHIPS**

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American Industrial Hygiene Association	1985 to Present
American Society for the Testing of Materials	1987 to Present
American Society of Materials	1994 to Present
National Asbestos Council	1984 to 1993
Environmental Information Association	1993 to Present
Materials Research Society	1988 to Present
Electron Microscopy Society Association	1988 to Present
Microbeam Analysis Society	1988 to Present
New York Academy of Science	1985 to 1987 1989 to 1994
Air Pollution Control Association	1985 to 1987
National Institute of Building Sciences	1991 to Present
The Society for Ultrastructural Pathology	1996 to Present
American Society of Heating, Refrigerating and Air-Conditioning Engineers	1996 to Present
The American College of Forensic Examiners – Diplomat of Forensic Engineering Technology	1999 to Present
American Conference of Governmental Industrial Hygienist (ACGIH) Associate Member	2006 to Present

**William Edward Longo**  
**Deposition and Trial Testimony**

<u>Date</u>	<u>Doc. Type</u>	<u>Case Name</u>	<u>Court Filed</u>	<u>State Filed</u>
7/15/1999	Deposition	Esparza, et al. vs. Owens Corning, et al.; Bustamante, et.al. vs. Owens Corning	District Ct., 34th Judicial Dist, El Paso County , TX; Count Ct at Law #3, El Paso County	TX
7/23/1999	Deposition	Flack, et al. vs. PPittsburgh Powers, et al. vs.. Crown Cork & Seal Co., et al.	128th Judicial District Ct., Orange County TX	TX
8/11/1999	Deposition	Powers, et al. vs. Crown Cork & Seal Co., et al.	250th Judicial District Ct., Orange County, TX	TX
2/21/2000	Deposition	Browning, et al. vs. Anchor Packing Company, et al.;	261 Judicial District Ct. & 25th Judicial District Courts, Travis County TX	TX
4/20/2000	Deposition	Cavanaugh vs. Owens-Corning Corp	District Ct. Bexar County TX	TX
5/8/2000	Deposition	Moten, et al. vs. Owens Corning Corp et al.	128th Judicial District Ct., Orange County TX	TX
5/17/2000	Cont'd Depo	Cavanaugh vs. Owens Corning Corp	District Ct., Bexas County, TX 47th Judicial District	TX
6/1/2000	Deposition	Hoffman vs. Georgia Pacific Corp. et al.	US District ct., Northern District of Georgia, Atlanta Division	GA
6/6/2000	Trial Testimony	Sutton vs. AC7S, Inc. et al.	District Ct. 356th Judicial District, Hardin County, TX	TX
6/16/2000	Deposition	Howland et al. vs. Owens Corning et al.	County Court at Law Smith County TX	TX
7/20/2000	Deposition	Cavanaugh et al. vs. Owens Corning et al.	District Ct Bexar County TX 57th Judicial District	TX

7/26/2000	Deposition	Lindsey vs. Owens-Corning Fiberglas Corp. et al.	21st Judicial District Ct. Livingston Parish LA	LA
8/3/2000	Trial Testimony	Howland et al. vs. Owens Corning et al.	County Court @ Law, Smith County TX	TX
8/22/2000	Deposition	Richardson et ux. vvs. AC&S, Inc. et al.	353rd Judicial District Ct., Travis County TX	TX
10/3/2000	Trial Testimony	Wesley Roberts et al. vs. Owens-Corning Corp, et al.	18th Judicial District Ct. Iberville Parish LA	LA
10/26/2000	Trial Testimony	Rhine vs. North American Refractories Company	Court of Common Pleas Civil Div., Cuyahoga County OH	OH
11/13/2000	Trial Testimony	Piskur vs. Georgia Pacific Corp. (Successor to Bestwall Gypsum Co.) et al.	Superior Ct. Fulton County GA	GA
12/15/2000	Deposition	Davis, et al. vs. Owens-Corning Fiberglas	County Court at Law No. 3, El Paso County TX	TX
1/20/2001	Deposition	Toney vs. Georgia Pacific Corporation Corp., et al.	Superior Ct. Fulton County GA	GA
2/26/2001	Deposition	Davis, et al. vs. Owens-Corning Fiberglas	County Court at Law No. 3, El Paso County TX	TX
3/28/2001	Deposition	Meadows vs. Anchor Packing Co. et al.	74th Judicial District Ct., McLennan County TX	TX
6/20/2001	Trial Testimony	In Re: Lamar County Asbestos Litigation	6th District Ct., Lamar County TX	TX
8/20/2001	Trial Testimony	Alfredo Hernandez v. GAF Corporation et al.	County Court El Paso County TX	TX
8/27/2001	Trial Testimony	Larry Ronald Tucker v. Dresser Industries	128th District County Orange County TX	TX
8/27/2001	Trial Testimony	Bell, et al. vs. Dresser Industries, et al.	128th Judicial District Ct., Orange County TX	TX
9/20/2001	Trial Testimony	Edward T.W. Chang v. Owens- Illinois, Inc. et al.	Circuit Court of the 1st Circuit State of Hawaii	HI

10/9/2001	Deposition	Lambert vs. Proko Industries, Inc. et al.	District Ct. Brazoria county, TX, 23rd Judicial District	TX
11/2/2001	Trial Testimony	Gerke, et al. vs. ACandS, et al.	Superior Ct., County of Alameda, CA	CA
11/5/2001	Trial Testimony	Gerke, et al. vs. ACandS, et al.	Superior Ct. County of Alameda, CA	CA
11/6/2001	Trial Testimony	Gerke, et al. vs. ACandS, et al.	Superior Ct. County of Alameda, CA	CA
11/19/2001	Trial Testimony	Robinson, et al. vs. NARCO	Court of Common Pleas Civil Div., Cuyahoga County OH	OH
12/6/2001	Trial Testimony	Betty Wilson, Individually & as Personal Rep of the Heirs & Estate of Leonard Wilson, Deceased vs. Able Supply Company, et.al.	23rd Judicial District Brazoria County TX	TX
1/10/2002	Trial Testimony	New York City Asbestos Litigation "Jose Lopez"	Supreme Court of the State of New York	NY
1/11/2002	Deposition	Tuck, et al. vs. Arvin Industries, Inc. et al.	State Ct., Fulton County GA	GA
1/30/2002	Trial Testimony	William Anderson vs. A-Best Products et al.	Allegheny County Pennsylvania	PA
4/23/2002	Trial Testimony	Karen & Jeffrey Peterson vs. Hill Brothers Chemicals	Alameda County Superior Court	
5/6/2002	Deposition	Mansel vs. U.S. Gypsum Co. et al.	District Ct., Brazoria County, TX 149th Judicial District	TX
6/6/2002	Trial Testimony	Verda Sutton & P.D. Sutton v. AC&S	356th Judicial District Hardin County TX	TX
8/2/2002	Deposition (Vol. 1)	Auzenne vs. U.S. Gypsum Co. et al.	County Court at Law No. 3, El Paso County TX	TX
8/14/2002	Deposition	Withers, et al. vs. GAF Corporation, et al.	District Ct., Brazoria County, TX 149th Judicial District	TX

8/30/2002	Deposition	Martinez vs. GAF Corporation, et al.	District Ct. of El Paso County, TX County Court at Law No. 3	TX
10/1/2002	Trial Testimony	Asbestos Trial Group	In the Circuit Court of Kanawah County, WV	WV
10/2/2002	Trial Testimony	In Re: Asbestos Trial Group WV	Circuit Court, Kanawha	WV
11/4/2002	Deposition	Landry vs. Avondale Industries, Inc., et al.	Civil District Ct/, Orleans Parish LA	LA
11/12/2002	Trial Testimony	In Re: All Asbestos Cases	Circuit Ct., City of Newport News VA	VA
11/19/2002	Deposition	Lonnie Hubert Von Raeder vs. Crown Cork & Seal Co., et al.	District Ct., Dallas County TX 68th Judicial District	TX
12/6/2002	Deposition	Harmon et al. vs. Owens Corning, et al.	District Ct., Dallas County TX, 298th Judicial District	TX
12/9/2002	Deposition	In Re: Baltimore City Asbestos Litigation Mesothelioma Trial Cluster-Johnson, et al. vs. AC&S (Cases affected: Johnson Marcellino, Norair, Sibley)	Circuit Ct., Baltimore MD	MD
1/13/2003	Trial Testimony	Thurman Harmon; Glendell Don Maxey; Minnie Jun McGuire et al. vs. Owens Corning et al.	District Court Dallas County Texas 28th Judicial District	TX
1/20/2003	Deposition	Chambers, Jr., et al. vs. National Service Industries, et al.	Circuit Ct., Clairborne County MS	MS
3/20/2003	Trial Testimony	George Stewart v. A-Best Products et al.	Allegeny County PA	PA
4/14/2003	Cont'd Depo	Chambers, Jr., et al. vs. National Service Industries, et al.	Circuit Ct.	MS
4/25/2003	Deposition	Dailey, et al. s. GAF Corporation, et al.	County Court at Law No. 3, El Paso County, TX	TX



5/1/2003	Video Depo	Diaz, et al. vs. Foster Wheeler Energy Corp., et al.	County Court at Law No. 2, Dallas County, TX	TX
5/21/2003	Trial Testimony	In Re: Personal Injury Asbestos Litigation 5/12/03 Meso Trial Group - Harris, et al. vs. C & S (Cases Affected: Charles Bildstein, Walter Cooper, Anthony Wajer)	Circuit Ct. Baltimore MD	MD
6/19/2003	Trial Testimony	Eddie Caffey at I. vs. Foster Wheeler Energy Corp.	Cass County TX Judge Burgess 5th District	TX
7/10/2003	Deposition	Cowan vs. Crown Cork & Seal Co. et al.	District Ct. Orange County, TX 128th Judicial District	TX
8/5/2003	Trial Testimony	Louis Barletta & Mary Jane Barletta v. AW Chesterton	Kleberg County TX 105th Judicial District	TX
8/15/2003	Deposition	Parker, et al. vs. GAF Corporation (successor to Ruberoid Corp.) et al.	District Ct., Brazoria County, TX 23rd Judicial District	TX
9/11/2003	Deposition	Ramirez vs. Owens-Corning, et al.	District Ct., 214th Judicial District Nueces County, TX	TX
9/22/2003	Hearing	Tyre US. CSX Transportation	Circuit Ct., Jacksonville	FL
9/29/2003	Deposition	Messier, et al. vs. Honeywell International Inc., et al.	District Ct., Harris County, TX 215 Judicial District	TX
11/6/2003	Trial Testimony	Shiller vs. Garlock	Cass County TX Judge Burgess 5th District	TX
11/16/2003	Trial Testimony	Bertucci v. Northrop Grumman	Parish of Orleans Miriam G. Waltzer Judge Ret. Special Master	LA
11/18/2003	Voir Dire Exam at Trial	Blandford, et al. vs. Garlock Sealing Technologies, L.L.C.	Court of Common Pleas, Cuyahoga County, OH	OH

11/18/2003	Deposition	Yeager vs. Marathon Oil Co. et al.	Circuit Ct., 2nd Judicial Circuit Crawford County IL	IL
11/19/2003	Trial Testimony	Blandford, et al. vs. Garlock Sealing Technologies, L.L.C.	Court of Common Pleas, Cuyahoga County OH	OH
12/10/2003	Deposition	Adams, et al. vs. A.W. Chesterton, et al.	Circuit Ct., Little River AR	AR
3/1/2004	Trial Testimony	Paul Verret & Judith Verret vs. American Bilrite Ind. et. al.	Judge Curry 17th Judicial District Tarrant County, TX	TX
4/12/2004	Deposition	Murphy vs. Owens-Corning Fiberglas Corporation, et al.	Court of Common Pleas, Greenville, County SC	SC
4/14/2004	Deposition	In Re: Baltimore City Asbestos Litigation - May 11 2003 Meso Trial Group (Edwards, et al. vs. A C and S, Inc., et al.)	Circuit Ct., Baltimore City MD	MD
6/8/2004	Deposition	Fimple, et al. vs. Lac D'Amiante du Quebec, et al.	Circuit Ct., Crawford County AR	AR
6/22/2004	Deposition	In Re: Baltimore City Asbestos Litigation - June 29, 2004 All Issue Trial Group (Everett, et al. vs. AC&S, Inc. et al. - Cases Affected: Ronald B. Mezick)	Circuit Ct., Baltimore City, MD	MD
7/14/2004	Deposition	Presler v. The Lincoln Electric Company et al.	District Court of Brazorid	TX